

TITLE OF THE INVENTION

PLASMA PROCESSING SYSTEM IN WHICH WAFER IS RETAINED BY ELECTROSTATIC
CHUCK, ~~PLASMA PROCESSING METHOD AND METHOD OF MANUFACTURING~~
~~SEMICONDUCTOR DEVICE~~

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Background of the Invention

1. Field of the Invention

The present invention relates to a plasma processing system,
and to a plasma processing method, and to a method of manufacturing
a semiconductor device using the plasma processing system and method.
More particularly, the present invention relates to a method of
manufacturing a semiconductor device in which a wafer is chucked and
secured by utilization of an electrostatic chuck.

2. Description of the Background Art

A method of manufacturing an integrated circuit called an IC
or a LSI usually employs an etching process in a process of forming
a pattern. In a system to be used for the etching process, there
has been employed an electrostatic chuck for securing a wafer to an
electrode. The wafer is secured by means of utilizing an electrostatic
force developing in the electrode. The electrostatic force is
generated by means of applying a high frequency, such as microwaves,
to the inside of a processing chamber where the wafer is to be processed.

Fig. 3 is a view for describing the structure of a conventional
plasma processing system (wafer etching system).

In Fig. 3, reference numeral 1 designates a wafer. For instance,
there is used a Si wafer 8 inches in diameter as the wafer 1. Although
not shown, a film to be etched, for example, an oxide film (SiO_2)
is formed on the wafer 1. Reference numeral 2 designates an insulating
coating placed on a power electrode 3 disposed in a processing chamber
(not shown). The wafer 1 is to come into contact with the insulating
coating 2. For instance, a film containing titania or alumina is
used as material of the insulating coating 2. The power electrode
3 chucks and retains the wafer 1 thereon by way of the insulating
coating 2. For instance, an aluminum alloy A5052 is used as material
for the power electrode 3. Reference numeral 4 designates a matching
circuit for matching the voltage of a high-frequency power supply
5 and the voltage applied to the power electrode 3.

The high-frequency power supply 5 produces a voltage for
producing plasma to be used for effecting an etching reaction. Further,